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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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KATHRYN A MARRA
General Motors Corporation
Mail Code 482-C23-B21
P.O. Box 300
Detroit, MI 48265-3000

EXAMINER

CORRIGAN, JAIME W

ART UNIT PAPER NUMBER

3748

DATE MAILED: 10/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/611,845

Applicant(s)

KUO ET AL.

Examiner

Jaime W Corrigan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 August 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to the Amendment filed on 01 August 2004. Claim 20 has been amended. Overall, claims 1-36 are pending in this application. The arguments with respect to the references applied in the first Office Action were deemed persuasive, however, a new Non-final rejection is set forth below.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 1, 5-7, 11, 15-19, 30-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Hitomi et al. (PN 6,626,164).

Regarding claims 1, 15, 30 Hitomi et al. discloses a method of operating a four-stroke internal combustion engine (See Abstract) including a variable volume combustion chamber defined by a piston (See Figure 1 (4)) reciprocating within a cylinder between top-dead center and bottom-dead center points and at least one intake valve (See Figure 1 (9)) and one exhaust (See Figure 1 (10)) valve controlled during repetitive, sequential exhaust, intake, compression and expansion strokes of said piston comprising: providing a closed exhaust valve and a closed intake valve during an expansion stroke of said piston (See Abstract, Column 14 Lines 2-6); providing an open

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exhaust valve and a closed intake valve during an exhaust stroke of said piston (See Column 14 Lines 2-6); providing a closed exhaust valve and a closed intake valve during an intake stroke of said piston to establish a low pressure (See Figure 7, Column 9 Lines 52-61) condition within the combustion chamber; providing an open exhaust valve and an open intake valve during said intake stroke of said piston to ingest (See Figure 2, Figure 7, Abstract, Column 4 Lines 13-22, 28-39, Column 11 Lines 6-45, Column 14 Lines 2-6) combusted gases and fresh air, respectively, into said combustion chamber; and, providing a closed exhaust valve and a closed intake valve during a compression stroke of said piston (See Abstract, Column 14 Lines 2-6).

Regarding claim 5 Hitomi et al. discloses providing a rebreathe event wherein said exhaust valve is open during at least a portion of the intake event (See Figure 2, Figure 7, Abstract, Column 4 Lines 13-22, 28-39, Column 11 Lines 6-45, Column 14 Lines 2-6).

Regarding claim 6 Hitomi et al. discloses said rebreathe event is initiated subsequent to initiation of said intake event (See Figure 2, Figure 7, Abstract, Column 4 Lines 13-22, 28-39, Column 11 Lines 6-45, Column 14 Lines 2-6).

Regarding claims 7, 11 Hitomi et al. discloses said rebreathe event is terminated prior to termination of said intake event (See Figure 2, Figure 7, Abstract, Column 4 Lines 13-22, 28-39, Column 11 Lines 6-45, Column 14 Lines 2-6).

Regarding claim 16 Hitomi et al. discloses said low pressure event is established by controlling phasing of an exhaust event exhaust valve closure and the intake valve opening (See Figure 2, Figure 7, Abstract, Column 4 Lines 13-22, 28-39, Column 11 Lines 6-45, Column 14 Lines 2-6).

Regarding claim 17 Hitomi et al. discloses the exhaust event exhaust valve closure absolute phase relative to exhaust stroke top dead center is not greater than the intake valve opening phase after exhaust stroke top dead center (See Figure 2, Figure 7, Abstract, Column 4 Lines 13-22, 28-39, Column 11 Lines 6-45, Column 14 Lines 2-6).

Regarding claim 18 Hitomi et al. discloses the exhaust event exhaust valve closure occurs before exhaust stroke top dead center (See Figure 2, Figure 7, Abstract, Column 4 Lines 13-22, 28-39, Column 11 Lines 6-45, Column 14 Lines 2-6).

Regarding claim 19 Hitomi et al. discloses the exhaust event exhaust valve closure occurs after exhaust stroke top dead center (See Figure 2, Figure 7, Abstract, Column 4 Lines 13-22, 28-39, Column 11 Lines 6-45, Column 14 Lines 2-6).

Regarding claim 31 Hitomi et al. discloses closure of the exhaust valve that is open during the exhaust stroke occurs at an absolute phase angle relative to exhaust stroke top dead center about not greater than the phase angle after exhaust stroke top

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dead center at which opening of the intake valve occurs (See Figure 2, Figure 7, Abstract, Column 4 Lines 13-22, 28-39, Column 11 Lines 6-45, Column 14 Lines 2-6).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-4, 8-10, 12-14, 20-29, 32-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hitomi et al. (PN 6,626,164).

Hitomi et al. discloses the invention as recited in claims 1, 15, 30 above, however, fails to disclose a combustion chamber pressure, exhaust valve lift range, rebreath, exhaust valve and intake valve event angular ranges. It is the Examiner's position that the various particular pressures, lift ranges and angular ranges would have been an obvious matter of design choice well within the level of ordinary skill in the art depending on design variables such as engine load and speed requirements. Moreover, there is nothing in the record which establishes that the claimed applied forces presents a novel or unexpected result (See *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975)).

Response to Arguments

Applicant's arguments with respect to claims 1-36 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Steinmann et al. (PN 6,178,956), Meacham et al. (PN 3,714,932), Flynn et al. (PN 6,276,334), Matsumoto (PN 5,623,904), Mikame (PN 2001/0017114 A1), Mikame (PN 6,530,351), Hitomi et al. (PN 5,590,626), Nakajima et al. (PN 4,350,129) disclose similar timing methods.

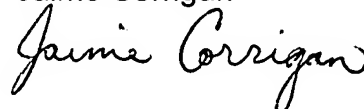
Any inquiry concerning this communication from the examiner should be directed to Examiner Jaime Corrigan whose Crystal City telephone number is (703) 308-2639 and the Carlyle telephone number (as of 11-23-04) is (571) 272-4858. The examiner can normally be reached on Monday - Friday from 8:30 a.m. – 6:00 p.m. 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas E. Denion, can be reached on (703) 308-2623. The fax number for this group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0861.

JC

Jaime Corrigan




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October 24, 2004

Patent Examiner

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THOMAS DENION
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3700